(12) UK Patent Application (19) GB (11) 2 156 837 A

(43) Application published 16 Oct 1985

(21) Application No 8508279

(22) Date of filing 29 Mar 1985

(30) Priority data
(31) 8408183 (32) 29 Mar 1984 (33) GB

(51) INT CL⁴
C08L 23/06 C08K 5/00 G02B 6/44

(52) Domestic classification
C3V EB ED
C3W 100 217
F2N 1B6
G2J GCA1
U1S 1366 1915 C3V F2P G2J

(71) Applicant
British Telecommunications plc (United Kingdom), 81 Newgate Street, London EC1A 7JA

(72) Inventor
Stephen Anthony Cassidy

(74) Agent and/or Address for Service
Eric Wolff,
Intellectual Property Unit, Room 1304, 151 Gower Street, London WC1E 6BA

(56) Documents cited
GB A 2084927
GB 1529316
GB 1435538
GB 1352347
GB 1230189
GB 1182469
GB 1175059
GB 0949638
GB 0851975
GB 0818728
GB 0789698
GB 0752820
US 3896101

(58) Field of search
C3K
C3V
F2N
H2C

(54) Optical fibre transmission lines

(57) Improved insertion and withdrawal of an optical fibre member (3) by propelling the fibre member by means of fluids drag through a pathway (2) of a conduit (1) is obtained by the addition to the conduit material, or the sheath material of the fibre member, of an adherence reducing substance such as an antistatic agent, slip agent, or anti-block agent, or a combination of these.

A commercially available product which provides a combination of all three agents as well as an anti-oxidizing agent, is suitable for addition to polyethylene from which is extruded the conduit (1), or the sheath (4) of the fibre member (3).

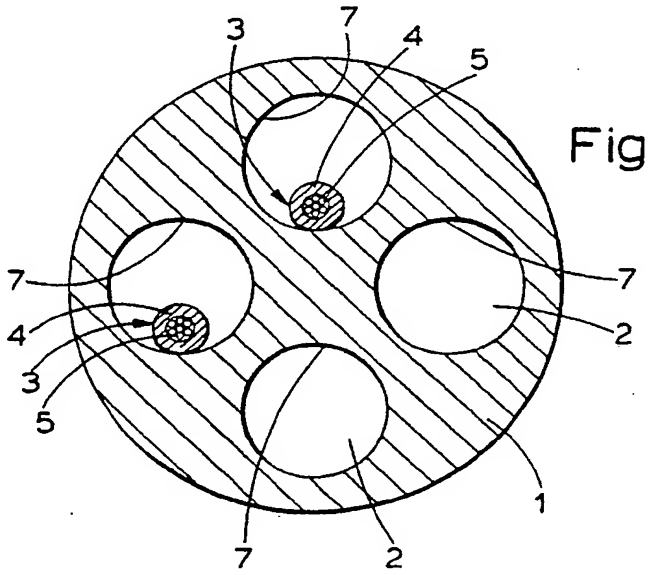


Fig.2

GB 2 156 837 A

Fig.1

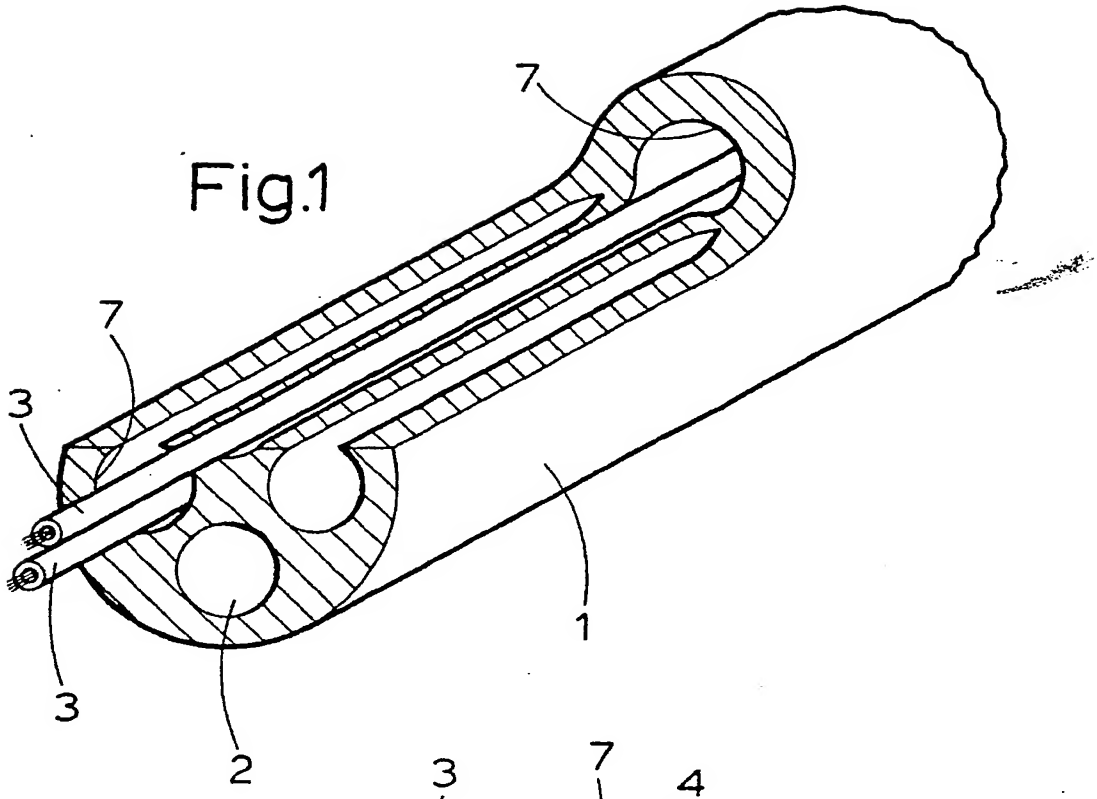
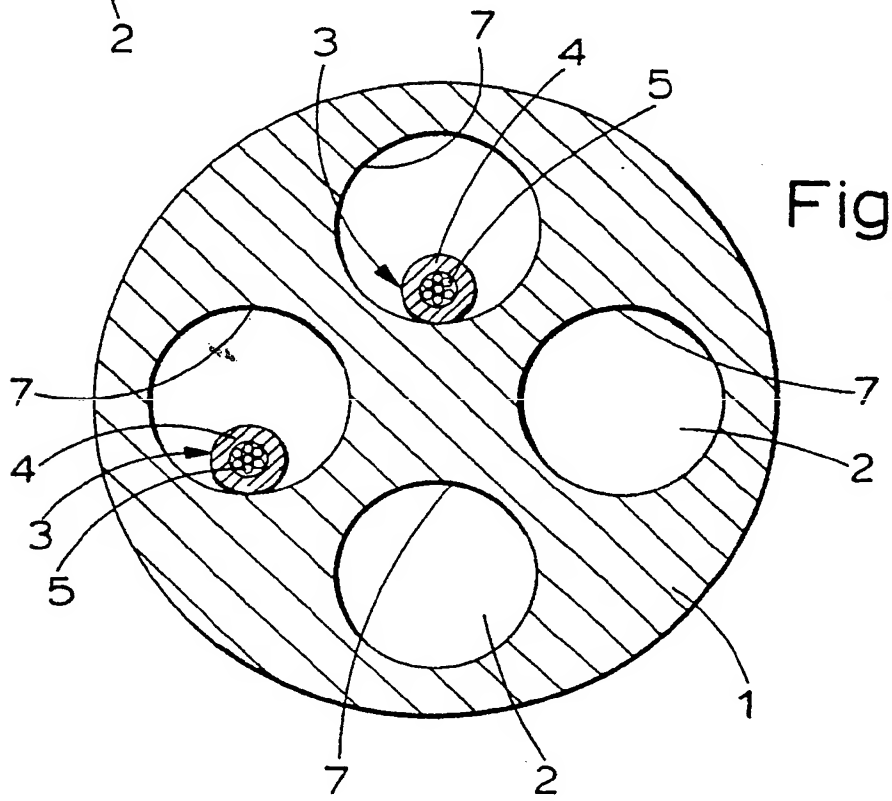


Fig.2



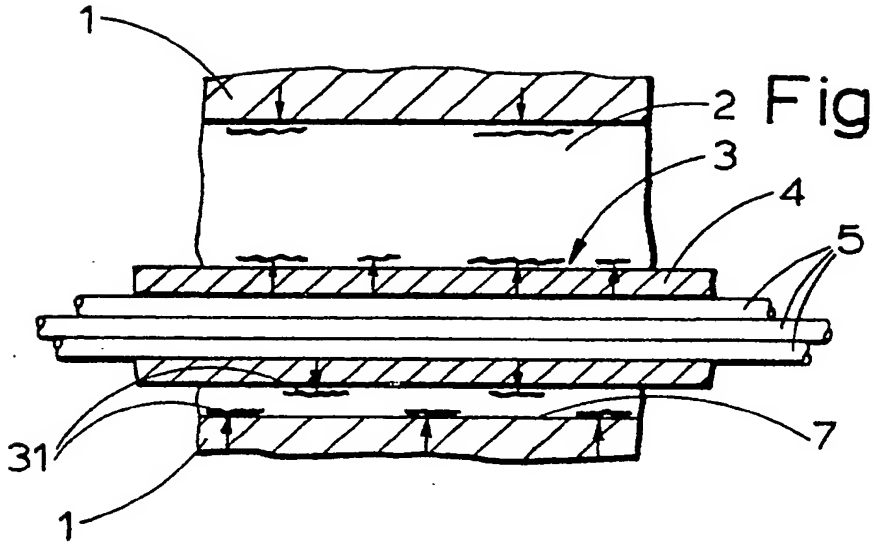


Fig.3

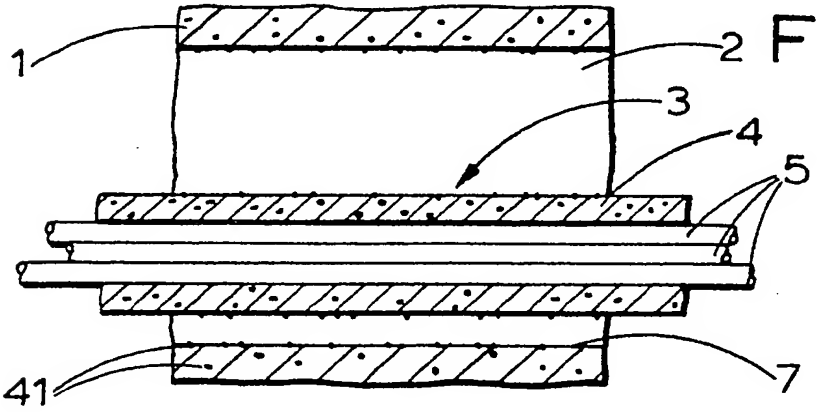


Fig.4

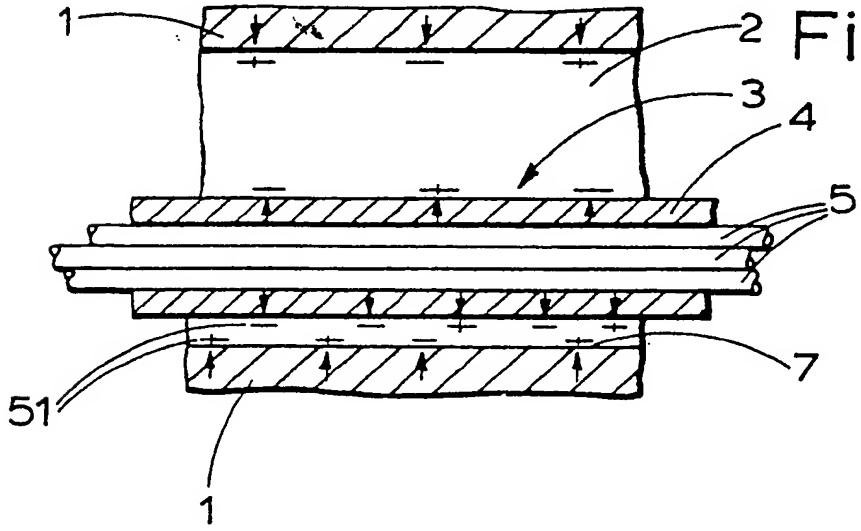


Fig.5

SPECIFICATION

Optical fibre transmission lines

This invention relates to optical fibre transmission lines, and in particular to means and methods of installing optical fibre transmission lines.

A technique of installing optical fibre transmission lines is disclosed in European Patent Application No 83306636.8, of 1 November 1983 and in the name of the present applicants, which technique comprises propelling optical fibre members through previously installed tubular pathways by drag forces generated by flow of a gaseous propellant through the pathways. One or more pathways may be provided in a single conduit, and the optical fibre members may comprise one or more optical fibres enclosed in a common sheath. The method may also be used for subsequent insertion or withdrawal of fibre members.

The present invention has as one of its aims to improve the means to carry out the invention of European Patent Application No 83306636.8

According to the present invention, material forming a wall of a tubular pathway, and/or material forming a sheath of an optical fibre member comprises an adherence reducing substance.

Preferably the adherence reducing substance dissipates static electric potentials between the fibre member and the wall of the tubular pathway, or between different optical fibre members.

Additionally or alternatively, the adherence reducing substance may be such as to reduce friction between the fibre member and the wall of the pathway, or between different optical members in the same pathway.

The adherence reducing substance may be incorporated into the wall material or the sheath material respectively. Alternatively, the adherence reducing substance may be applied as a coating to the wall or the sheath respectively.

Preferably the adherence reducing substance comprises an additive to the wall material or the sheath material respectively.

The wall material or the sheath material respectively is conveniently an extruded plastics material, preferably an extruded polymer.

The purpose of the adherence reducing substance in to reduce adherence between the wall of the tubular pathway and the sheath of the optical fibre member, or between the sheaths of different optical fibre members, by reducing electrostatic attraction there between, and/or by reducing friction there between. The reduced adherence between the wall and the sheath, or between the sheaths, eases movement through the pathway of the optical fibre member and permits, for example, an increase of continuous lengths of insertion or withdrawal of optical fibre members as compared to hitherto.

In particular, electrostatic potentials between wall and sheath may be generated by the passage of the propellant gas through the pathway, which potentials would cause, in the absence of the adherence reducing compounds, increased contact between wall and sheath thus impeding the passage of the optical fibre member through the pathway.

The present invention will now be explained further with reference to examples and the accompanying drawings illustrating the examples.

In the drawings:–

Figure 1 is a schematic cut-way drawing of a conduit and optical fibre member according to European Patent Application 833306636.8;

Figure 2 is a magnified cross-section through the conduit and optical fibre member of Fig. 1; and

Figures 3 to 5 illustrate the properties of contact reducing compounds.

Referring first to Fig. 1, optical fibre transmission lines are installed by the technique disclosed in European Patent Application 83306636.8 into a conduit 1 comprising one or more tubular pathways 2 by passing a gaseous propellant such as, for example, air, through the pathways 2. The drag forces generated by the passage of the propellant act on optical fibre members 3 which themselves comprise one or more optical fibre 5 enclosed in a common sheath 4.

As explained in the aforesaid European Patent Application, among the main advantages of installing optical fibre transmission lines by this technique are, firstly, that the conduit 1 can be placed in position in a duct, for example, without containing any optical fibres (thus eliminating the problem of stressing in the fibres at this stage), and, secondly, that the forces acting on the fibre member are fairly evenly distributed along the whole length of the fibre member (thus leading to minimal stressing of the optical fibres at the time of that installation) rather than being concentrated at, for example, the leading end of a fibre member. A further advantage of said technique resides in the facility for freely adding, withdrawing or replacing optical fibre members subsequent to the initial installation.

Although satisfactory results had been obtained with the technique that is the subject of the aforesaid European Patent Application, it is clearly desirable to increase the maximum length of pathway through which a fibre member can be propelled for insertion or subsequent withdrawal.

Such improvement has been made possible by the present invention which provides for materials for the conduit 1 and/or for the sheath 4 to comprise an adherence reducing

substance.

In one example, the conduit comprised extruded polyethylene, to which was added a small proportion, less than 3% by volume, of a compound commercially available from BXL Plastics Limited of Grangemouth Works, Inchyra Road, Grangemough, Stirlingshire, United Kingdom, as product number PZ 146.

Product PZ 146 comprises a slip agent, an anti-block agent, an antistatic agent, and an antioxidant. The function of these four agents will now be briefly explained further with reference to Figs. 3 to 6.

The slip agent of PZ 146, as shown schematically at 31, is an organic chemical which, being incompatible with polyethylene, is repelled by the polyethylene onto the surface thereof, and acts as a lubricant. Hence friction between the surfaces of wall material and the sheath material is reduced thereby lessening the frictional forces opposing passage of the optical fibre member (3 of Figs. 1 and 3) along the tubular pathway.

As mentioned above, passage of the gaseous propellant, or rubbing contact between the surfaces of the wall and the sheath, can lead to build up of electrostatic potentials therebetween, the resulting electrostatic attraction causing adherence of the sheath to the wall and hence impairment of the passage of the optical fibre member along the pathway. Adding a polar organic chemical such as the antistatic component of PZ 146 which migrates to the surface of the material containing it, (as shown schematically at 51 of Fig. 5) increases the surface conductivity of the wall or the sheath, allowing electric charges on the surface to be dissipated rapidly to the atmosphere. The efficiency of the charge dissipation may be increased further by corona discharge treatment.

The additive PZ 146 further contains a so called anti-block component (schematically shown as 41 in Fig. 4) which comprises microscopic inorganic particles distributed throughout the host material. Those of the particles which are at the surface improve flow of the gaseous propellant between the surfaces of the wall and the sheath, thus lessening adherence therebetween.

Finally, in order to improve the stability of those of the above agents that are present, particularly during the hot processing stages of extrusion, PZ 146 also incorporates an anti-oxidant component.

From this brief exposition it will readily be appreciated by the person skilled in the art that the presence of PZ 146 in the polyethylene of the conduit 1 of Fig. 1 will reduce the adherence between the optical fibre member 3 and the wall 7 of the tubular pathway 2.

CLAIMS

1. Material for a conduit that provides one or more tubular pathways to accommodate one or more optical fibre members, in which the material defining the tubular pathway or pathways comprises an adherence reducing substance.

2. Material for a sheath of an optical fibre member comprising an adherence reducing substance.

3. Material as claimed in claim 1 or claim 2 being an additive to a host material.

4. Material as claimed in any preceding claim being applied as a coating to a host material.

5. Material as claimed in any preceding claim capable of dissipating static electric potentials.

6. Material as claimed in claim 5 capable of dissipating static electrical potentials to an ambient gaseous medium.

7. Material as claimed in any preceding claim comprising slip agents.

8. Material as claimed in any preceding claim comprising anti-block agents.

9. Material as claimed in any preceding claim comprising anti-oxidizing agents.

10. Material as claimed in any preceding claim comprising between less than 5% of volume of PZ 146.

11. Material as claimed in any preceding claim comprising between 2% and 3% by volume of PZ 146.

12. Material as claimed in any preceding claim comprising a host component of extruded polyethylene.

13. A conduit providing one or more tubular pathways to accommodate one or more optical fibre members, the conduit comprising material according to any one of claims 1 to 12.

14. A sheath for an optical fibre member comprising material according to any one of claims 1 to 12.

15. A conduit and/or a sheath according to claim 13 and/or claim 14 respectively, for use with a method of propelling an optical fibre member along a tubular pathway by drag forces generated by a propellant medium passing through the pathway.

16. A conduit and/or a sheath as claimed in claim 15 for use with a method of propelling a fibre member by a gaseous propellant medium.

Printed in the United Kingdom for
Her Majesty's Stationery Office, Dd 8818935, 1985, 4235.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.